OCEAN TECHNOLOGY Spin-offs

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Establishment of NIOT

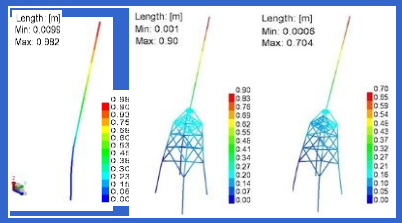
- NIOT was formed on 5th November 1993 to serve as the technical arm of Department of Ocean Development (now MoES), Government of India
- Major aim is to develop reliable indigenous technology to solve the various ocean engineering problems for sustainable ocean resource exploration and exploitation
- Under International Sea Bed Authority (ISBA), India is the pioneer investor to work in Poly-metallic nodule site in Indian Ocean regions and being allocated 150,000 sq km for exploration.

NIOT at IIT campus

Present campus

NIOT Activities at a glance

Energy and Freshwater

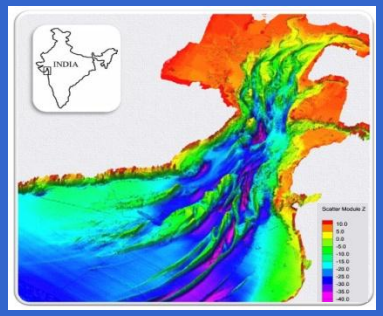


Offshore Structure

Deep Sea Technology

Ocean Observation System

Ocean Acoustics



Coastal & Environmental Engineering

Marine Sensor Systems

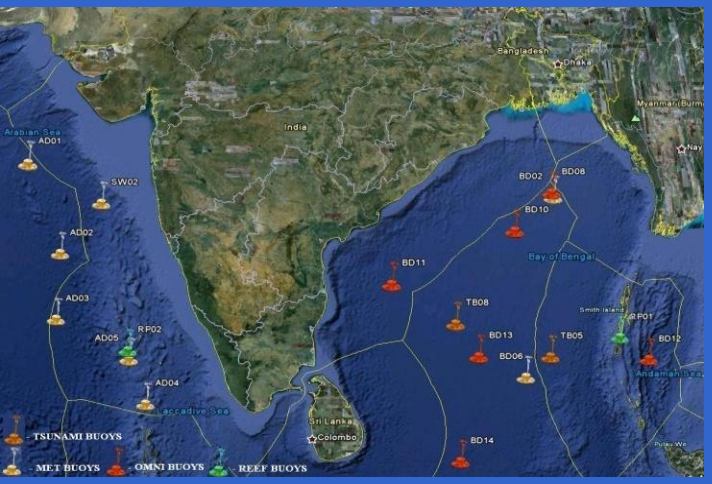
Marine Bio Technology

Ocean Electronics

Gas Hydrates

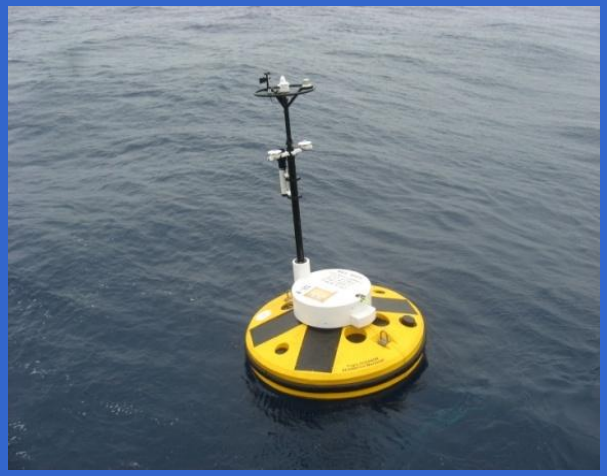
Vessel Management

Net worked Ocean Observation System



Locations of system deployment

Twin Buoy

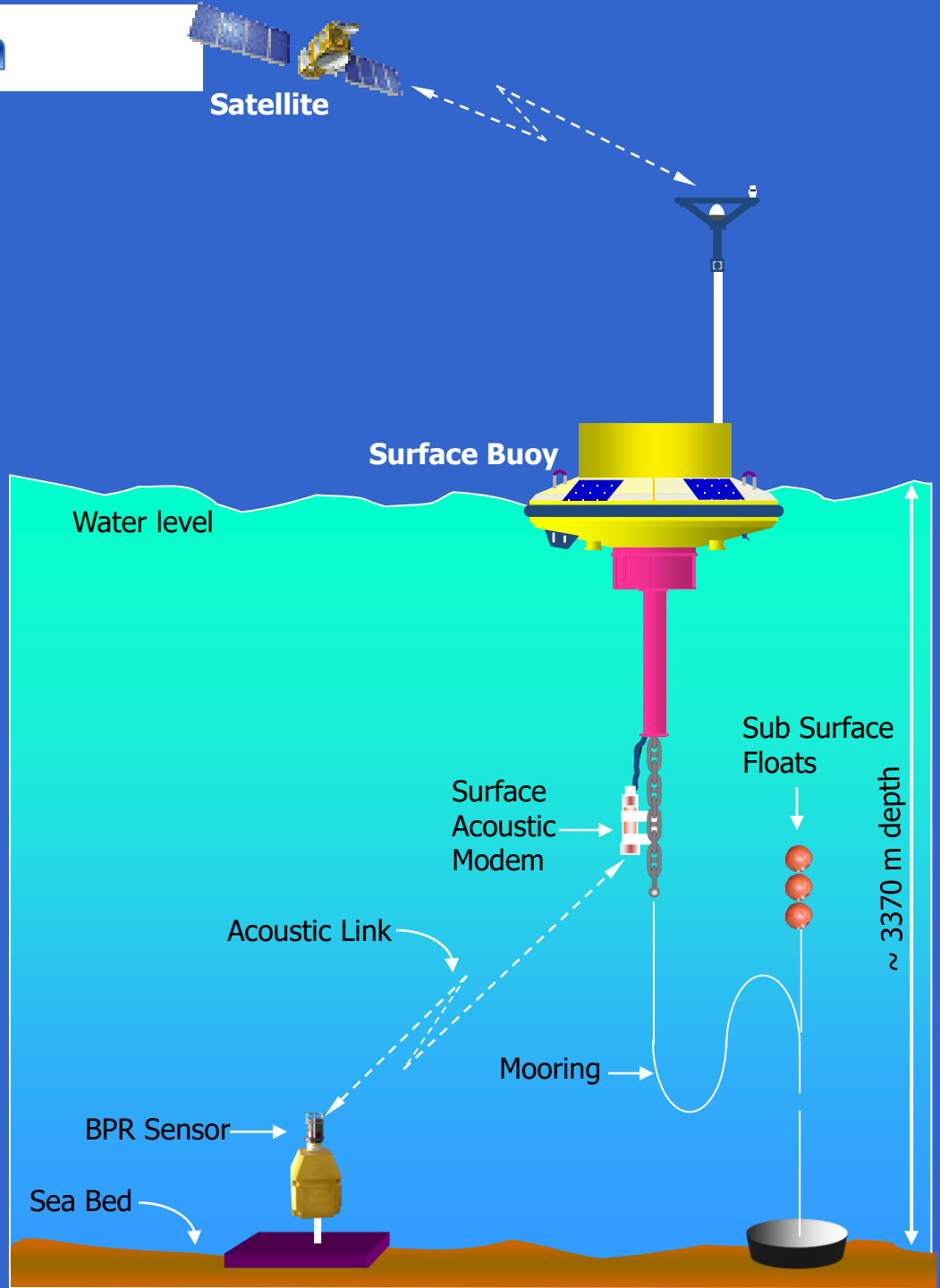


Omni Buoy

Deep ocean moored Buoy

BPR Electronics and Tsunami Surface buoy

Tsunami Monitoring System

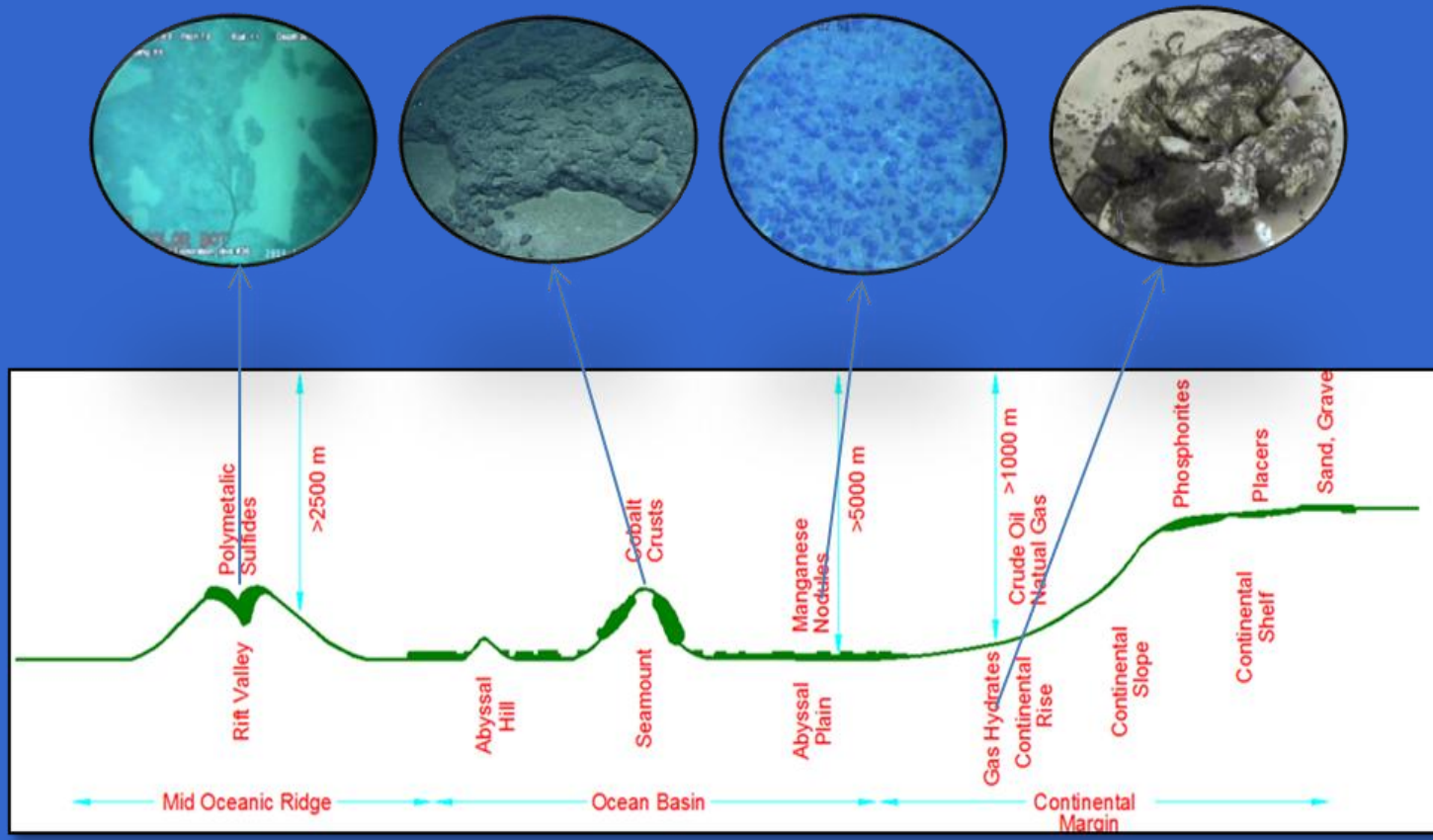


Deep Sea Technologies

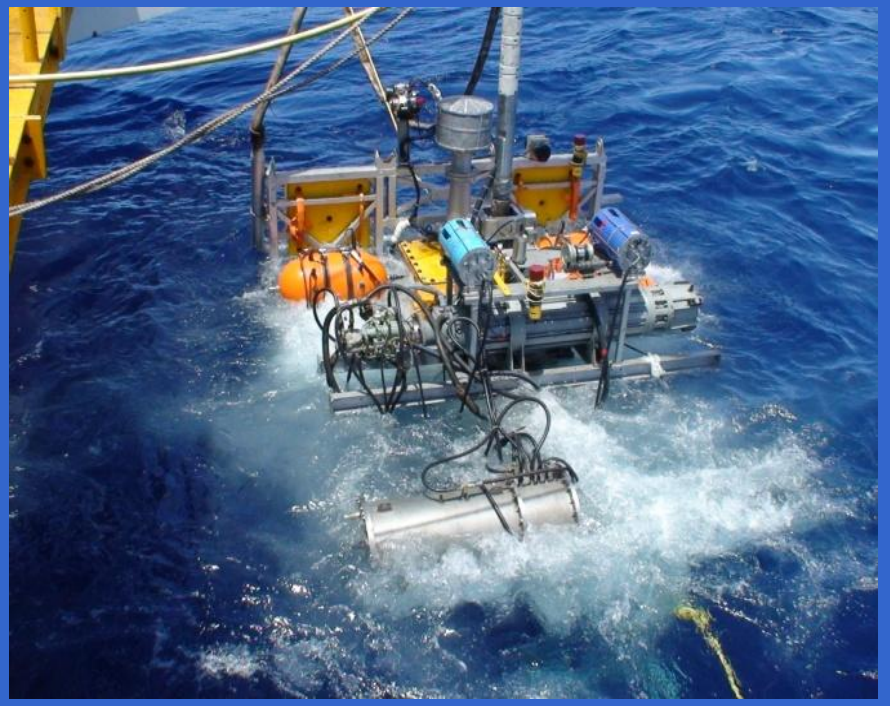
Minerals from the Oceans

Ministry of Earth Sciences has been involved in technology development for exploration and harvesting of ocean mineral such as:

- Poly Metallic Nodules ~5500m
- Gas Hydrates in marine sediments > 1000 m
- Hydrothermal Sulphides >2500m



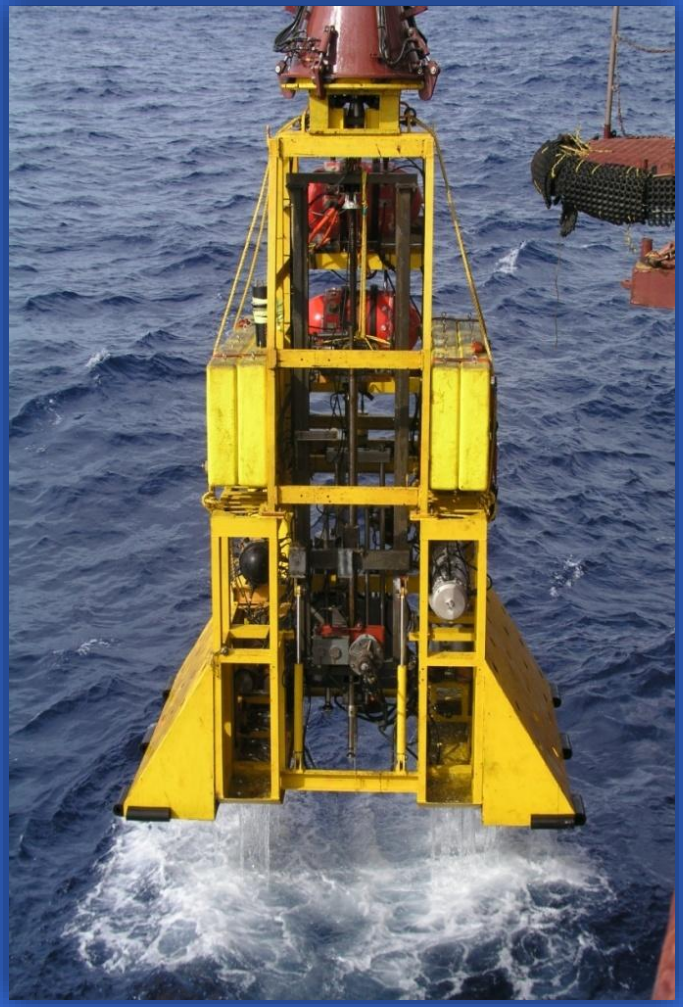
Underwater mining system sea trial



Insitu-soil Tester

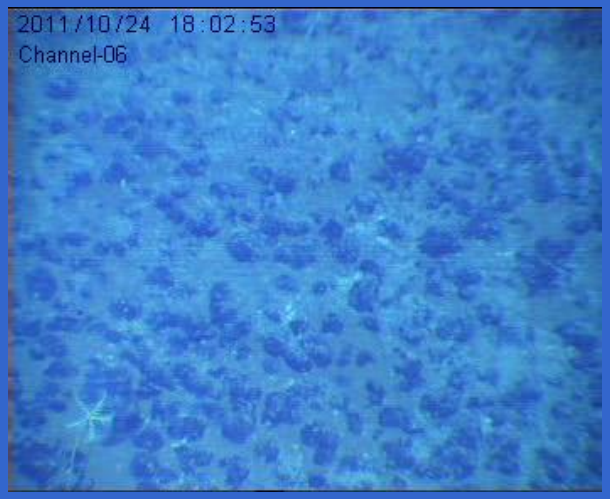
- An Remotely Operable in-situ soil tester capable of operations at 6000m depth
- Measurement of in-situ properties of soft sea floor possible (<2.5 kPa)

Accuracy - +/- 2% of full scale
Cone stroke - Maximum 6 m
Three cones to cover ranges
- 0.05 to 10 kPa,
- 0.1 to 25 kPa
- 1 to 50 kPa
Rod diameter - 45 mm
Vane Range -0 to 10 kPa

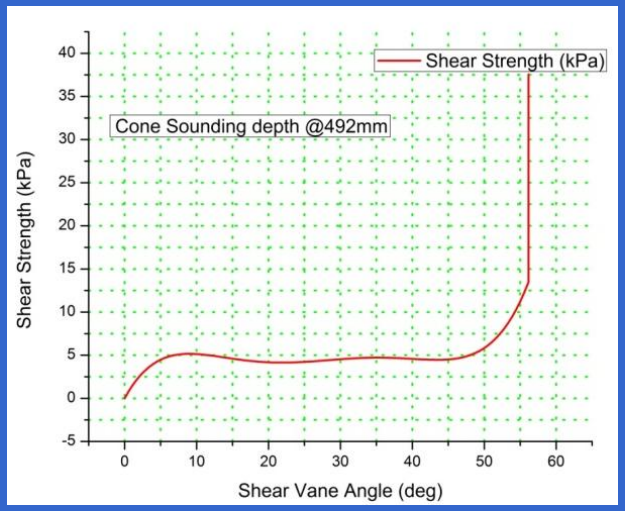


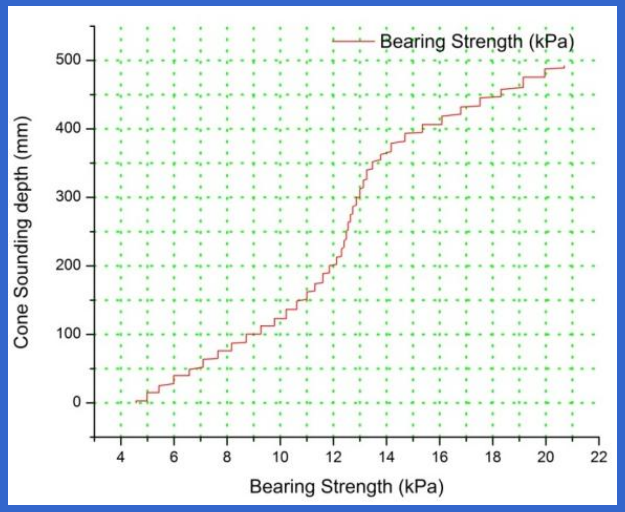
Insitu-soil tester sea trial at Central Indian Ocean Basin

Vane operation on the sea bed



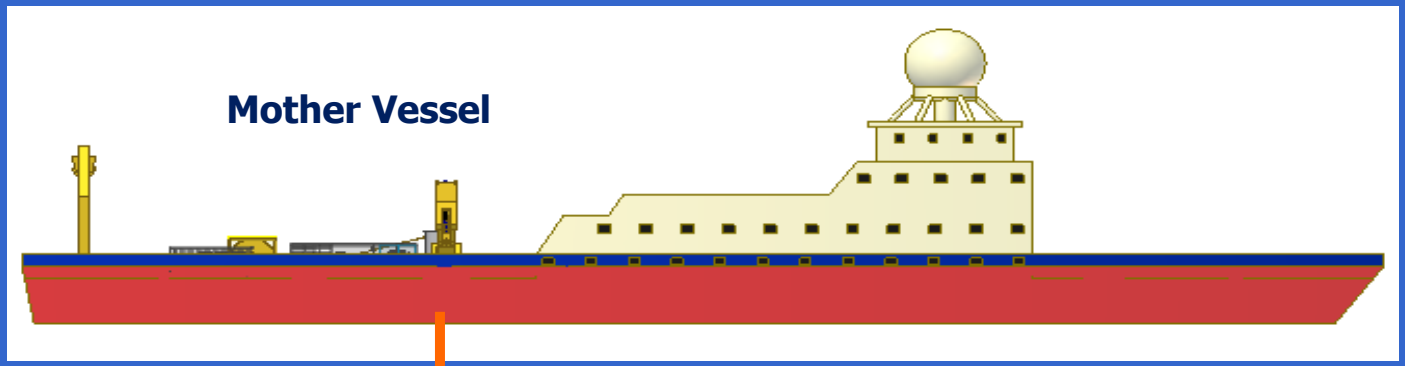
Nodule field at CIOB taken from soil tester





Shear vane and Cone readings of in-situ Soil Tester at CIOB

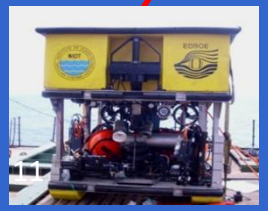
General Schematic of Remotely Operated Vehicle (ROSUB 6000)



Umbilical Cable 7000 m

TMS

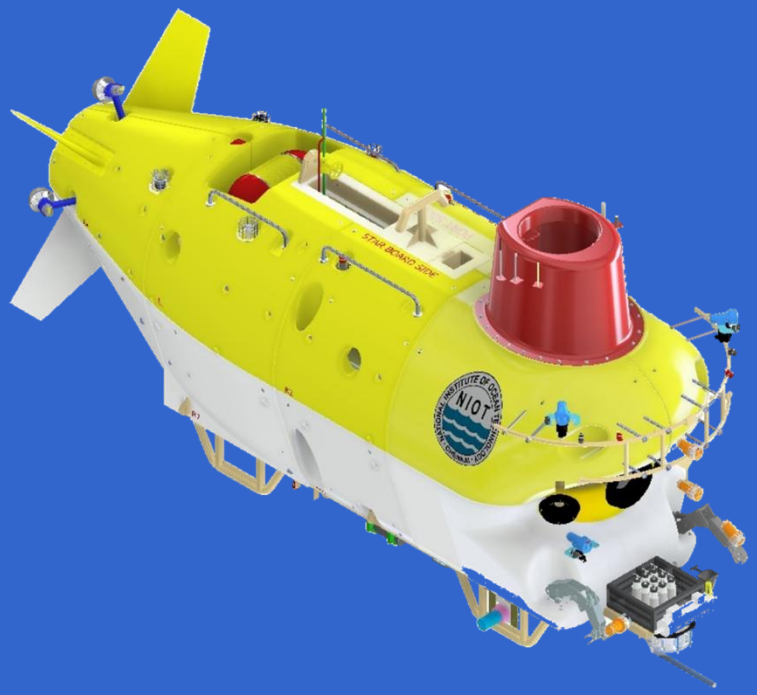
Tether Cable 440 m

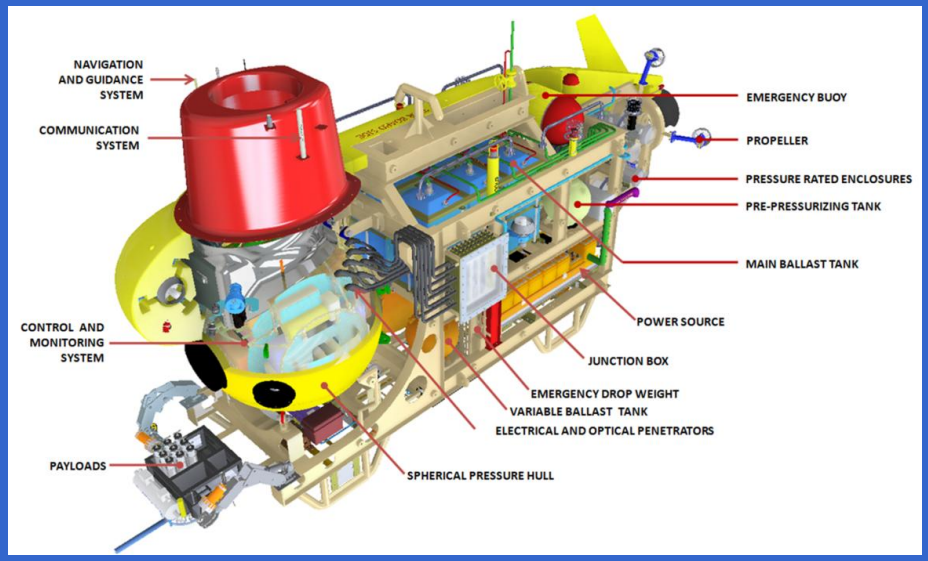


ROV

1. ROV (Remotely Operated Vehicle)
2. TMS (Tether Management System)
3. SHIP SYSTEM
   a. Storage Winch
   b. LARS
   c. HPU (Hydraulic Power Unit)
   d. Control console
   e. Power Distribution System

Manned Submersible



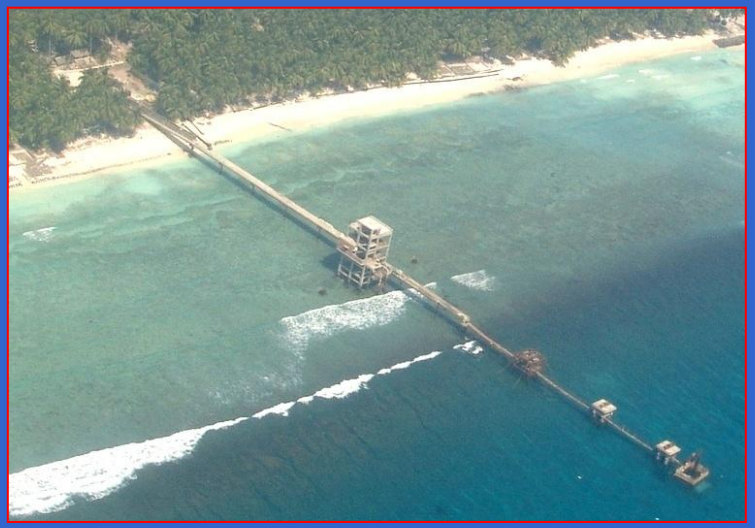


Under the Deep Ocean Mission, towards exploration of deep ocean minerals, deep water manned submersible MATSYA 6000 for underwater exploration is being designed and developed. Vehicle shall be deployed for the exploration of deep ocean mineral resources such as poly-metallic manganese nodule, hydrothermal sulphides, cobalt crust, methane hydrates etc.

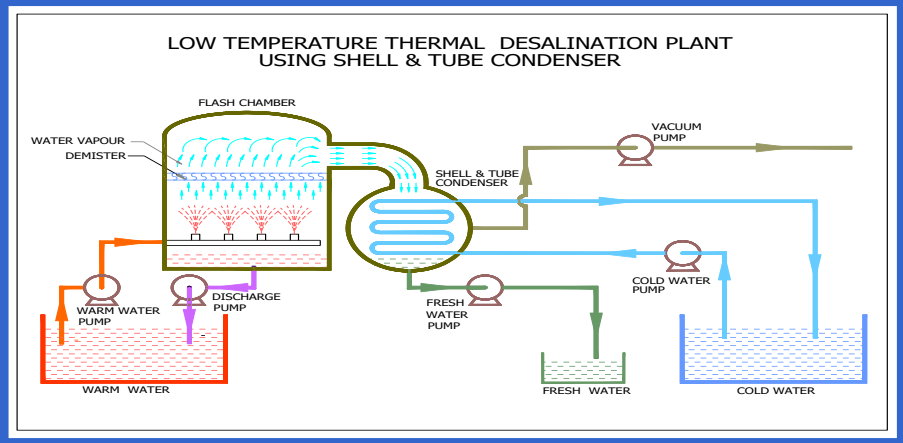
Technology Development –
Renewable Energy and Fresh Water from the sea

Low Temperature Thermal Desalination plants for Islands

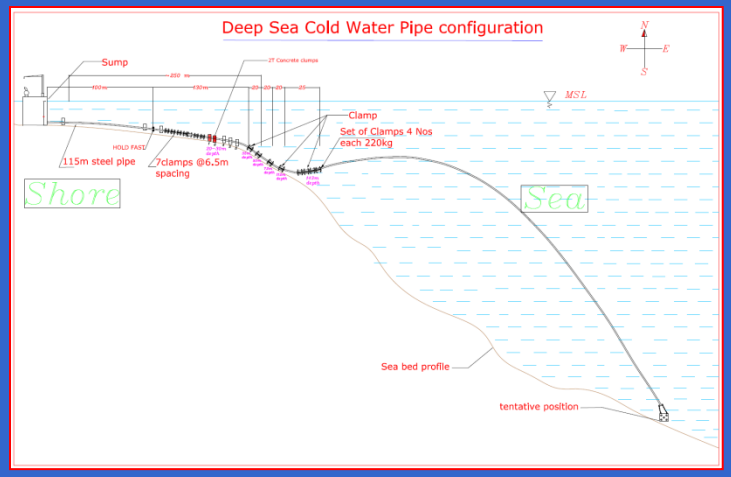
Since 2005 NIOT plants are in operation for island community drinking water by LTTD principle. Three islands are having NIOT commissioned plants and further island based plant development are under progress.



Overall View of the Plant



Schematic diagram

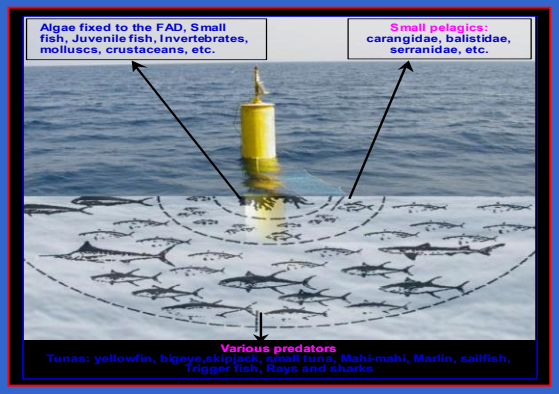


Marine Biotechnology

Fish Aggregating Devices (FAD)

FAD location

FAD Deployed

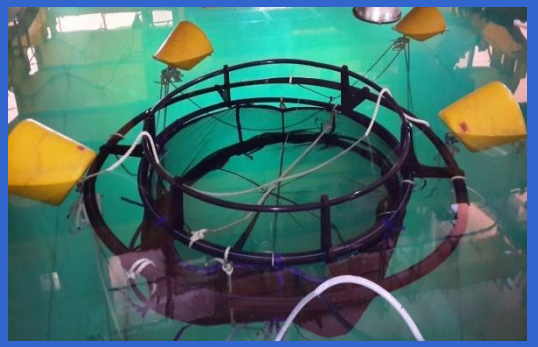


FAD concept

- Deployed 38 oceanic FADs at a depth of 1000 – 1200 m around Lakshadweep (28) and Andaman and Nicobar (10) Islands.
- FADs help in increasing the fish catch and at the same time reducing the operational time and fuel cost
- Increase in the fish landing and fish variety was reported by Lakshadweep and Andaman and Nicobar Islands

Open Sea Cage Culture

- Developed and tested 9 m Ø circular HDPE cages with multipoint mooring system in diverse sea conditions.
- Pilot scale open sea cage culture was demonstrated with hatchery reared seabass, cobia, pompano and wild caught milkfish, parrotfish, giant trevally.
- An innovative concept of nursery rearing of marine finfish in open sea cages was demonstrated.
- Developed and tested prototype submersible cages.



Vessel Management Cell

CRV Sagar Tara

CRV Sagar Anveshika

Sagar Manjusha

Acoustic Test Facility

- State of the art facility for calibrating underwater acoustic transducers
- Completely automated Acoustic Calibration System (ACS) for 3–100 kHz range

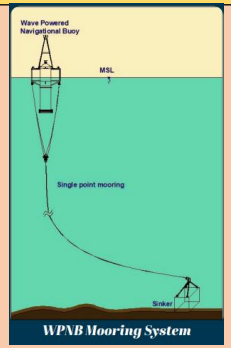
Hyperbaric Test Facility

- Designed to test pressure up to 90 MPa (900 bar) max

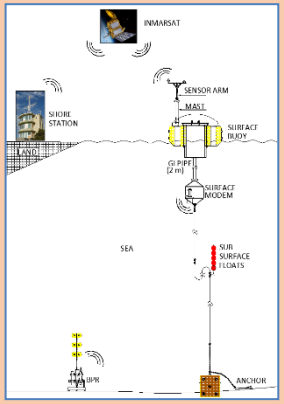
Test pond to test the heavy vehicles functionality

Technologies Commercialized till 2026

Technologies Commercialized till 2026				
Sl.No	**Name of Know-How**	**Name of MSME/ Entreprenuers/ Start-ups**	**Brief Writeup**	**Schematic Representation**
1	Remotely Operated Vehicle	M/s Laursen & Toubro Limited	Remotely Operated Vehicle is used for offshore surveys conducted to study seabed conditions and marine resources including valuable minerals from the ocean floor and Gas hydrate surveys to identify methane hydrate deposits beneath the seabed.	
2	Robo Coastal Observer	M/s CT Control Technology (India) Pvt Ltd	NIOT has successfully design and developed Robo Coastal Observer (RCO) for real time data measurements of oceanographic and meteorological parameters. RCO is a self-propelled aquatic device that can be used for lake, river, coastal and deep sea surveillance purposes. It can also be used to rescue a person who has fallen overboard.	
3	Wireless Expandable Bathythermograph Conductivity Temperature and Depth Profile	M/s. Azista Industries Pvt. Ltd	A compact ocean profiling system designed to measure conductivity, temperature, and depth parameters in marine environments. The system enables rapid acquisition of vertical ocean profiles for scientific and operational studies. It supports ocean	

Sl.No	Name of Know-How	Name of MSME/ Entreprenuers/ Start-ups	Brief Writeup	Schematic Representation
4	Wave Powered Navigational Buoy	M/s Sangir Plastics Pvt Ltd,Gujarat	Power extraction based on the Oscillating Water Column (OWC) principle using wave energy. Currently under operation at Kamarajar Port Ltd, Chennai and oceanographic data and buoy's location are transmitted every hour to port authorities and other users	
5	Multiplex PCR Detection Kit for detecting virulent genes of Enterococcus faecal in water and seafood (MPCR)	M/s Saai Electro Biogenic India Pvt Ltd,Chennai	NIOT-E. faecalis Multiplex PCR master mix for the specified amplification and detection of virulent genes. Positive and negative PCR control mix helps to identify and interpret the virulence range of the pathogen.	
6	Process for the production of Lutein from Marine Microalgae	M/s Vectrogen Biologicals Pvt Ltd, Hyderabad	Lutein is a vital macular pigment in the retina of eye and protects the eye from the ionizing effect of blue light. It is essential for protecting the cellular components of the vital organs from oxidative damage.	

Sl.No	Name of Know-How	Name of MSME/ Entreprenuers/ Start-ups	Brief Writeup	Schematic Representation
7	Met Ocean Buoy System Type -1	Sh. S Ranganathan, M/s Laursen and Toubro Limited	Met ocean buoy system type - 1 is a floating moored platform consisting of Discus type FRP hull, instrument container, sensor arms, frames, FRP floats and other met sensors. The central processing unit was developed with rapid data collection feature during cyclone.	
8	Met Ocean Buoy System Type -2	Sh. S Ranganathan, M/s Laursen and Toubro Limited	Met Ocean Buoy System Type – 2 is floating platform anchored with Mooring and has the capability to measure Ocean Current, Conductivity and Temperature up to 500 m depth.	

Sl.No	Name of Know-How	Name of MSME/ Entreprenuers/ Start-ups	Brief Writeup	Schematic Representation
9	Indian Tsunami Buoy System	Sh. S Ranganathan, M/s Laursen and Toubro Limited	Indian Tsunami Buoy System (ITBS), developed and operated by the National Institute of Ocean Technology (NIOT), is used for monitoring the water level changes in deep oceans to identify the propagation of a tsunami wave.	
10	Autonomous underwater profiling drifter for 2000m of water depth (AUPD)	Sh. S Ranganathan, M/s Laursen and Toubro Limited	An autonomous underwater profiling drifter capable of collecting oceanographic data up to 2000 m depth. The system periodically profiles water column parameters and transmits the data for analysis. It is useful for long-term ocean monitoring and marine environmental studies.	
11	Drifter Buoy System with INSAT Communication	M/s. Norinco Private Limited	An autonomous ocean drifting platform integrated with INSAT communication for real-time transmission of oceanographic data. The system supports long-duration monitoring of surface currents, sea state, and environmental parameters. It enhances ocean observation	

Sl.No	Name of Know-How	Name of MSME/ Entreprenuers/ Start-ups	Brief Writeup	Schematic Representation
26	Saline Water Lantern	M/s Livelihood Alternative Private Limited	NIOT) has developed saline water lantern - Renewable Ocean System for Harnessing Novel Illumination (ROSHNI). The lantern uses the process of ionization to produce electrical energy when saline water reacts with magnesium alloy.	
31	C-Phycocyanin from Marine Spirulina	M/s Varre Corporate Solutions Pvt. Ltd.	C-phycocyanin inhibits lipid peroxidation, imparts anti-inflammatory activity, improves the immune system weakened by the toxicity of medicines, has proven hepatoprotective effect. C-PC is used in food coloring, cosmetics, and biomedical research.	

Sl.No	Name of Know-How	Name of MSME/ Entreprenuers/ Start-ups	Brief Writeup	Schematic Representation
12	Recombinant Ectoine from Deep Sea Bacteria for skin care and Cosmetic application	M/s Varre Corporate Solutions Pvt. Ltd.	Ectoine is used as an active ingredient in skin care and sun protection products. It stabilizes proteins and other cellular structures and protects the skin from stresses like UV irradiation and dryness.	

THANK YOU